



Geo-Targeted Alerting System Project Plan

August 6, 2010

Table of Contents

Introduction	3
Project Scope and Objectives	3
Roles and Responsibilities	4
NOAA will provide:.....	4
FEMA will be responsible for:	4
GTAS Information Systems	4
GTAS Security	5
GTAS Hardware Architecture.....	6
Concept of Operations	6
Project Management	8
GSD will provide the following documentation for the Project:	9
Timelines	9
Budget Breakdown	9

This Project Plan is in reference to Inter-Agency Agreement number HSFEMW-08-X-0326 Modification NO. TO002

Introduction

The Geo-Targeted Alerting System (GTAS) Project is a joint effort between the Federal Emergency Management Agency (FEMA), the National Oceanic and Atmospheric Administration (NOAA). As part of the Integrated Public Alert and Warning System (IPAWS), GTAS is a FEMA supported pilot project to identify future requirements that may be used to deploy a life-threat warning system nationwide. The basis for this project is to provide advanced capabilities to state and local government Emergency Operations Centers (EOC) to enhance public safety in the event of an atmospheric toxic release or severe weather events.

The release of biological, chemical or radiological agents into the atmosphere in a major metropolitan area could potentially kill hundreds of people in a matter of hours. Likewise, hazardous weather such as hurricanes, flash-floods and convective weather events can threaten life and property. To help address public safety it is necessary to rapidly predict the dispersion of a toxic release and other environmental hazards and provide targeted warnings with specific safety information.

FEMA serves as the Federal Executive Branch's Lead Agency for Continuity of Operations (COOP) and Contingency Programs. In this regard it is critical to establish the operation and maintenance of effective emergency communications and warning systems for public safety. FEMA's IPAWS and other Contingency Programs are designed to provide Americans with critical and timely hazard alerts and warning information that saves lives and property during emergencies and natural disasters. Established under FEMA's National Continuity Programs Office, IPAWS reflects the governments ultimate goal of providing alert and warning messaging in a coordinated manner over as many platforms as possible to ensure the widest dissemination of vital information to the public.

As part of IPAWS, this Pilot Project will determine *how* state and local government emergency management agencies will use advanced high-resolution weather and toxic plume information to warn the public of life threatening environmental hazards. The Pilot will be used to explore emergency notification techniques for specific geo-targeted areas and define public warning requirements for future deployments across the U.S.

The Project will be resourced by FEMA and operated by two NOAA line offices and participating respective state and local EOC's. The two NOAA line offices include:

1. NWS
 - a. Weather Forecast Offices (WFO's);
2. Office of Atmospheric Research (OAR)
 - a. Global Systems Division (GSD);
 - b. Air Resources Laboratory (ARL).

Project Scope and Objectives

Both NOAA and FEMA will coordinate on the development, testing and deployment of GTAS capabilities including toxic plume applications, hazardous weather products and alerting capability for geo-targeted areas where life-threatening situations exist. Specific objectives include:

1. Incorporate Atmospheric Release Advisory Committee (ARAC) toxic plume products into GTAS;
2. Integrate the Meteorological Assimilation and Data Ingest System (MADIS) into the GTAS processing and display system;
3. Include a 4.5-km regional area meteorological gridded area domain with a nested 1.5-km gridded weather analysis and prediction system to initialize the toxic plume model and to give emergency managers near-term high-impact public hazard data;
4. Deploy and demonstrate GTAS capabilities in three cities (Houston, TX; Lake Charles, LA; and Melbourne, FL) to include the local National Weather Service (NWS) Weather Forecast Office (WFO), local Emergency Operations Center (EOC), and their respective state EOC.

5. Insurance that the alert warning CAP message generated using GTAS meets the requirements of the FEMA IPAWS CAP v1.2 Common Alerting Protocol profile.
6. Integration of the FEMA Flood Map Modernization data into the GTAS application.
7. Integration of the Urban Area Orthoimagery System (UAOS) into the GTAS application.
8. Displays and ability to disseminate PNG, GIF, and TIFF images from the GTAS application.
9. Ability to deliver the FEMA IPAWS CAP v1.2 compliant messages to the IPAWS Aggregator for dissemination to local ETN providers and Cellular systems.

These objectives will be addressed by using GSD' GTAS data servers and interactive client display systems. GTAS data systems will be developed in GSD' Information Systems Branch (ISB) prototyping environment which will allow for rapid software changes that may be necessary to accommodate varied EOC operations. GTAS servers will be deployed to those NWS Regional Headquarters that take part in the Project and can accommodate the GTAS communications requirements. GTAS client applications will be deployed to the local and state EOC' and their respective NWS WFO'. Forecasters will collaboratively provide real-time weather and toxic plume guidance to emergency managers. Likewise, emergency managers will be able to routinely call up AWIPS weather products and toxic plume guidance from the GTAS data servers.

Documentation will identify user feedback, system usage information, performance data, user workload information and GTAS maintenance requirements.

GTAS data systems will be deployed in three cities, Houston TX; Lake Charles, LA; and Melbourne, FL. Each city will have three sites, the NWS WFO', their respective state EOC' and their respective city or county EOC. In the event of a toxic release or hazardous weather event emergency managers will have instant access to toxic plume dispersion and weather information. At each location systems will have interactive warning generation and connectivity to Emergency Telephone Notification (ETN) system providers. The planned timeline for the project will run for nine months starting July 12, 2010 and continuing until April 15, 2011 with possible extension for additional years/deployments if needed and agreed to by FEMA and NOAA.

Roles and Responsibilities

NOAA will provide:

1. Development of the GTAS client/server application and data servers;
2. Deployment of GTAS into NOAA operational facilities and state EOCs;
3. Test and evaluation of the workstation functions and system usage;
4. Routine status reports of the projects progress outlined in the Inter-Agency Agreement;
5. Periodic Project Reviews
6. System documentation.

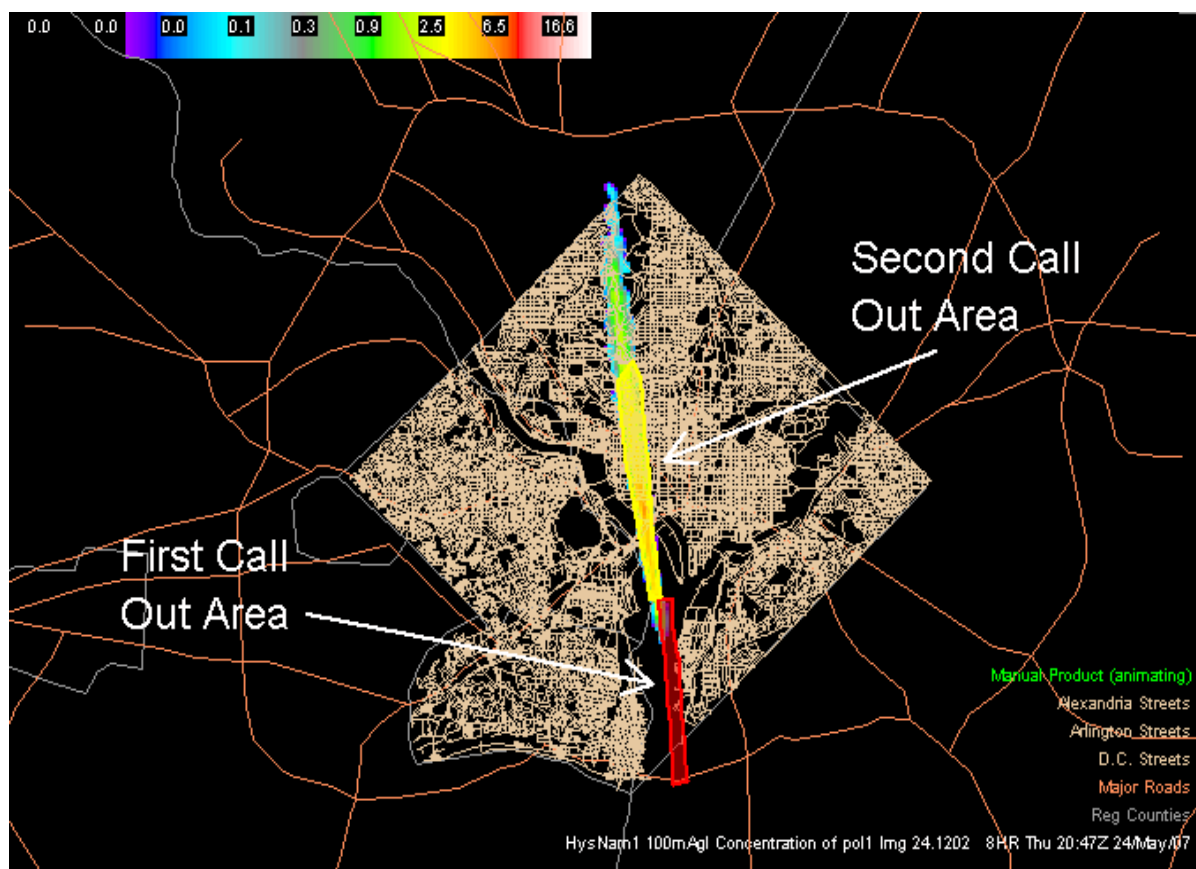
FEMA will be responsible for:

1. Funding resources for Inter-Agency Agreement number HSFEMW-08-X-0326 Modification NO. TO002;
2. Coordination of the Project with selected state government EOC'.

GTAS Information Systems

GTAS has been developed to communicate using TCP/IP to enable remote users to synchronize their displays for effective collaboration. The GTAS client application will display meteorological data and plume dispersion products on national, regional and local city scales. This allows emergency managers to interactively draw and annotate on the screen to create geo-targeted warning areas. Warning area coordinates can be sent in a CAP message to IPAWS FEMA aggregators and other dissemination systems procured by state and local governments. The GTAS client application contains real-time collaboration capability so that state, county, and city EOC' can exchange data, graphics, images and warning areas for shared situational awareness.

Additionally, it allows sharing of local datasets between sites, and allows forecasters to give real-time briefings to emergency managers. Incremental software releases can be downloaded as needed. Communications between client systems may be over a private network or the Internet. An example of the GTAS client application display showing a plume release with two user drawn warning areas for CAP message dissemination is shown below (the street map used below is only an example. A complete street map background will be used for GTAS deployment sites).



GTAS Security

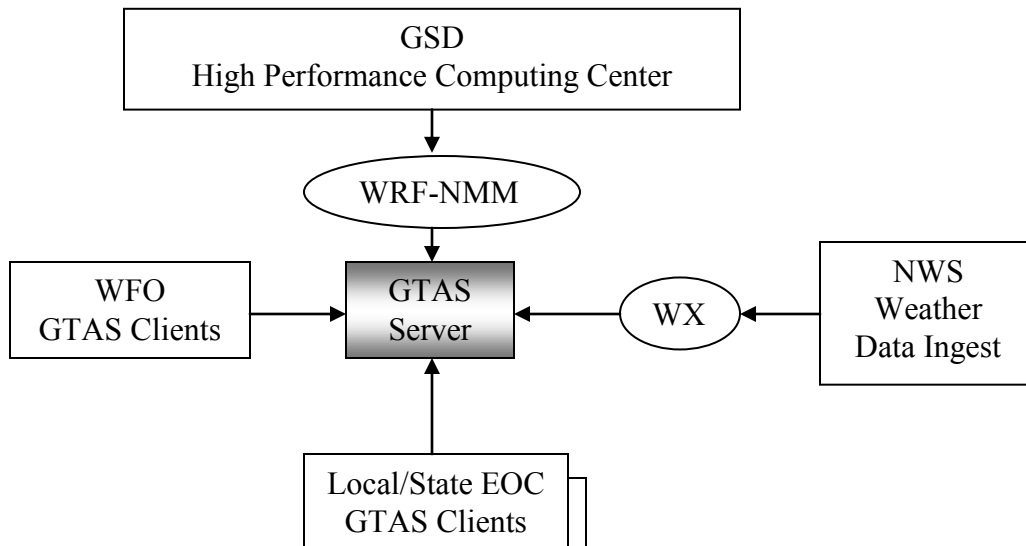
Firewalls, proxy servers, and network address translation have become an essential part of network security. Typically, firewalls allow outgoing traffic but restrict incoming communications. To support access to internet sites, many firewalls open a port for http protocol communications to external servers on the internet. This allows internal sites to contact an external server and have the server respond over the established communications channel. GTAS uses its own TCP/IP socket-to-socket communications implementation. In order to establish communications between the client and server, one or more ports need to be opened in the firewall for tcp/ip communications between GTAS clients and the GTAS servers. The startup scripts for the client and server allow the user to specify which port, or range of ports, to use.

It is worth noting that security requirements at NOAA's operational facilities continue to evolve as cyber threats change. GTAS security will need to continually be upgraded to make certain that state and local EOCs communications are maintained.

GTAS Hardware Architecture

GTAS server hardware runs on a Dell Poweredge 2950 PC with 8GB of memory, 2.66 GHz Xeon Quad E5430 Processor(s), and 500GB disk space. The server runs the Redhat Enterprise 5.0 Linux operating system. GTAS client workstations can be either Linux or Windows Operating System and are supplied by each site.

Diagram of GTAS Network



Concept of Operations

Collaborative briefings will take place as agreed to between the local WFO and their respective state and local government EOC's. When emergency managers display hazardous weather or toxic plume graphics and images, the EOC will determine if a life threatening condition exists and draw geo-targeted warning areas and coordinate public safety instructions. Emergency managers can deliver CAP messages to the FEMA IPAWS aggregator for dissemination to ETNs.

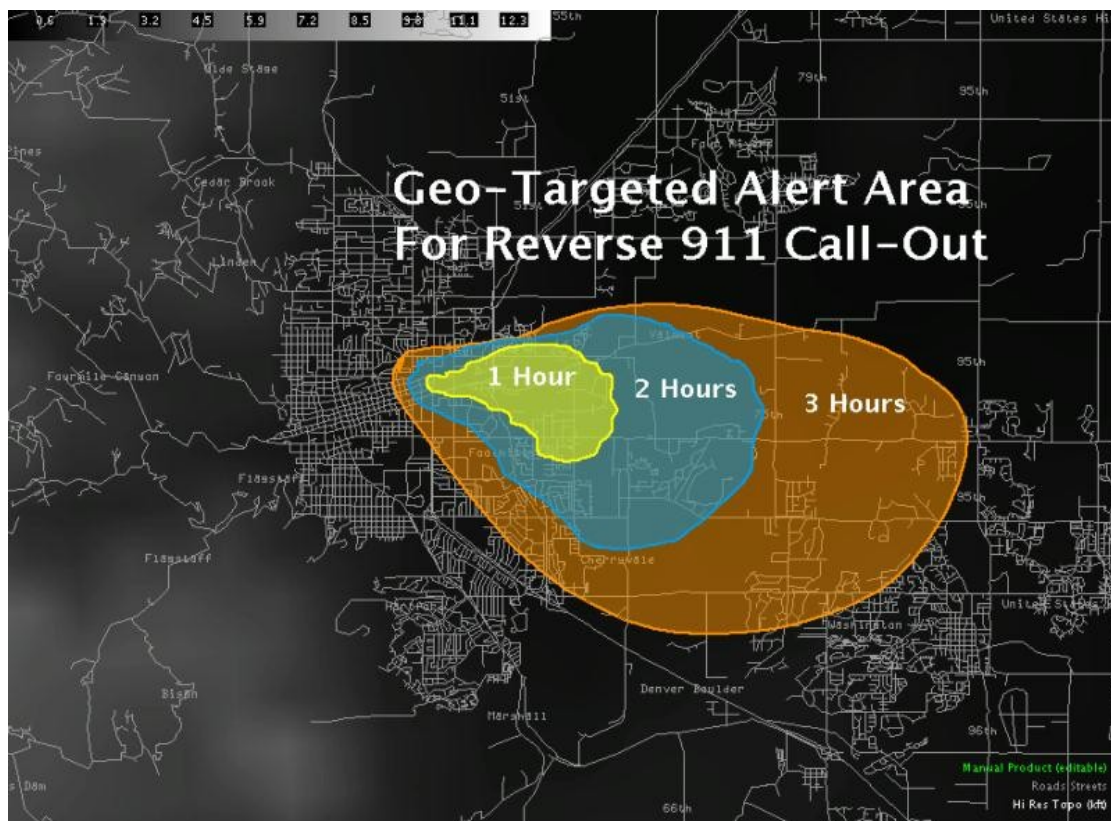
The NWS weather database will be used to generate advanced gridded state atmospheric variables every hour. These data sets include:

- Temperature
- Dewpoint
- Relative Humidity
- Wind (speed/direction)
- Weather Type
- Precipitation
- Snowfall Accumulation
- Wind Chill
- Sea Surface Wave Height
- Hurricane landfall probabilities
- Severe weather warnings and advisories
- Hazardous Weather Outlook – twice daily
- 500-meter plume dispersion output

- High-resolution numerical model output consisting of a 4.5-km regional area with a nested 1.5-km metropolitan area covering GTAS deployment sites.

Other data such as NOAA federal surface observing network and privately owned Meteorological Assimilation and Data Ingest System (MADIS) observations will be included. The federal surface observing systems will be updated every hour. MADIS observations (which provide high spatial density) will be updated every 15 minutes. Full resolution NEXRAD radar volume scans will be displayed and update the GTAS client every 10 minutes. The radar volume scans will be displayed in such a way so that non-meteorologists can easily interpret the information which will provide valuable heavy precipitation imagery. Overlaying the high-resolution radar imagery over local area map backgrounds will assist emergency managers to assess the potential for flash flood inundation. Satellite data will be updated hourly

GTAS simulations of a bio/chemical or radiological release will be conducted to obtain specific lead-time warning information for reverse-911 outbound calls and other IPAWS inter-operability dissemination systems. Conducting simulated toxic releases are important in order to learn how much time it takes to disseminate public safety information relative to the size of the warning area. These simulations will provide valuable timing data to emergency managers. More specifically, the length of a worded public warning message, the pre-determined number of attempts to redial busy signals, and the time of day of an event (daytime loads placed on the telecommunications infrastructure) all factor into the timeliness of warning dissemination. Population density within a warning area factors largely into the timeliness of warnings. Broadcasting geo-targeted warnings in Common Alerting Protocol (CAP) format will allow multiple communications systems to be used for issuing public safety information. Thus, regular simulated events of a toxic release will give emergency managers the information needed to understand and draw properly sized lead time warning areas given the relative rate of ETN outbound calling platforms and other communications systems. A GTAS display showing how an emergency manager may draw warning areas over both urban and suburban areas is shown below.



Toxic Plume Warning Area

Each warning area in the figure above shows different colors to illustrate the dispersion of a simulated toxic plume. Three separate reverse 911 messages could be used with specific call-for-action instructions for each area. For each warning message disseminated, a follow-up “all-clear” message is required.

The GTAS client will also be able to operate on a wireless PC laptop. This will enable emergency managers and incident commanders to have grab-and-go GTAS clients to call up relevant weather or toxic plume data, stay in constant contact with other emergency preparedness agencies and WFO forecasters, and target asset deployment while on the scene of a given event.



Project Management

The GTAS Project will be managed by GSD with guidance from NOAA’s NWS and OAR Line Offices. GSD will coordinate all Project management, development, deployment, training, evaluation and documentation activities. GTAS will be deployed to each city in phases. The order of each deployment will go as follows:

1. Melbourne, FL;
 - a. Melbourne WFO
 - b. Melbourne, NASA or County EOC
 - c. Florida State EOC
2. Lake Charles, LA;
 - a. Lake Charles WFO
 - b. Lake Charles City or County EOC
 - c. Louisiana State EOC
3. Houston, TX;

- a. Houston WFO
- b. Houston City or County EOC
- c. Texas State EOC

GSD will provide the following documentation for the Project:

1. Develop and maintain a Project Management Plan (Microsoft Word or Power Point);
2. Provide a Baseline Project Schedule (Microsoft Project);
3. Earned Value Management Report (EVM Application TBD)
4. Monthly Status Reports (Microsoft Word);
5. Risk Management Plan (Microsoft Word);
6. Risk Tracker (Microsoft Word);
7. System Design Document (Microsoft Word);
8. Implementation Plan (Microsoft Word);
9. Training Plan (Microsoft Word);
10. GTAS Concept Of Operations (CONOPS) (Microsoft Word);
11. GTAS Functional Requirements Document (FRD) (Microsoft Word);
12. GTAS Application Document (Microsoft Word);

Timelines

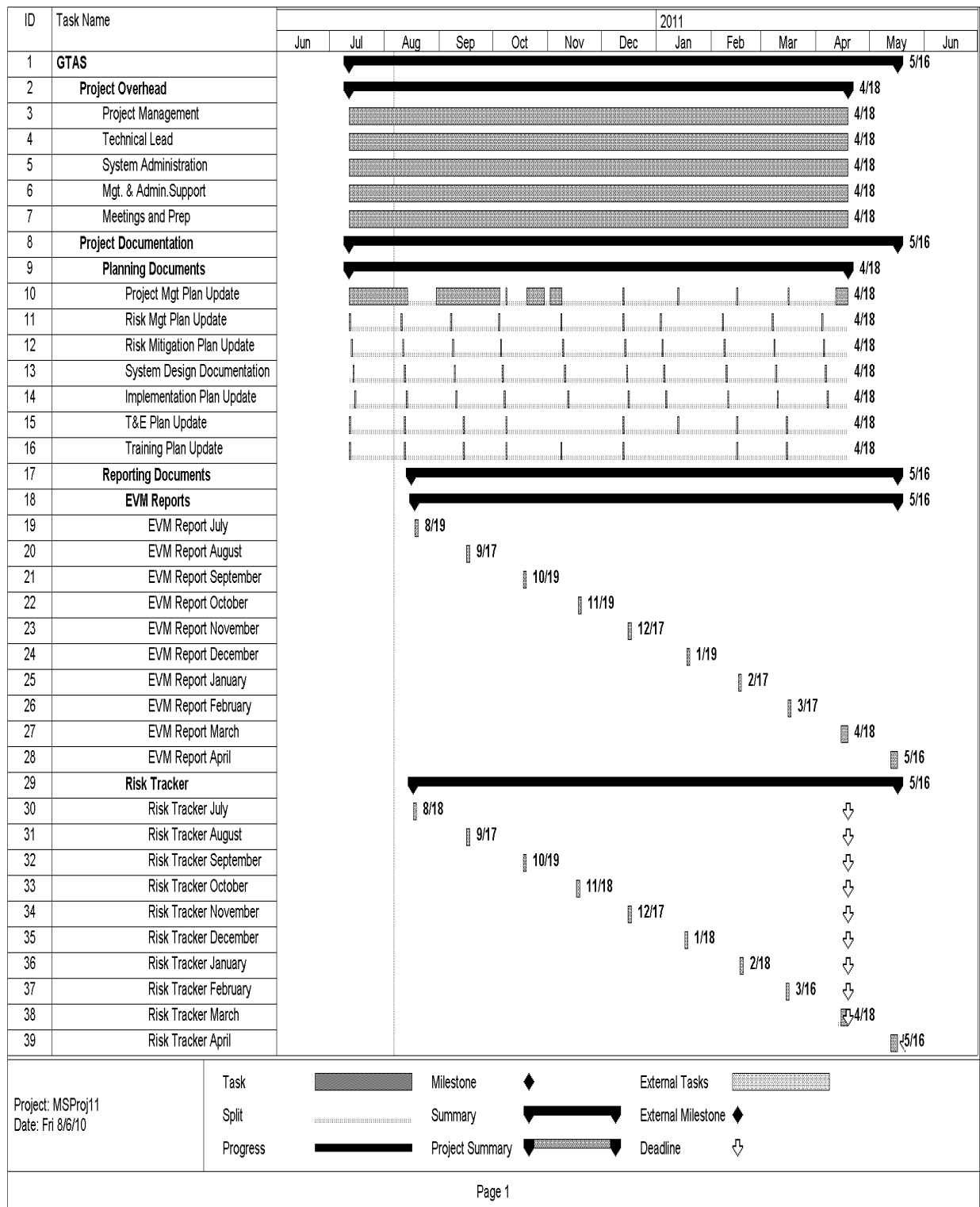
The Project will run from July 12, 2010 through April 15, 2011. Specific timelines for all GTAS Project activities are given in the accompanying Microsoft Project Spread Sheet.

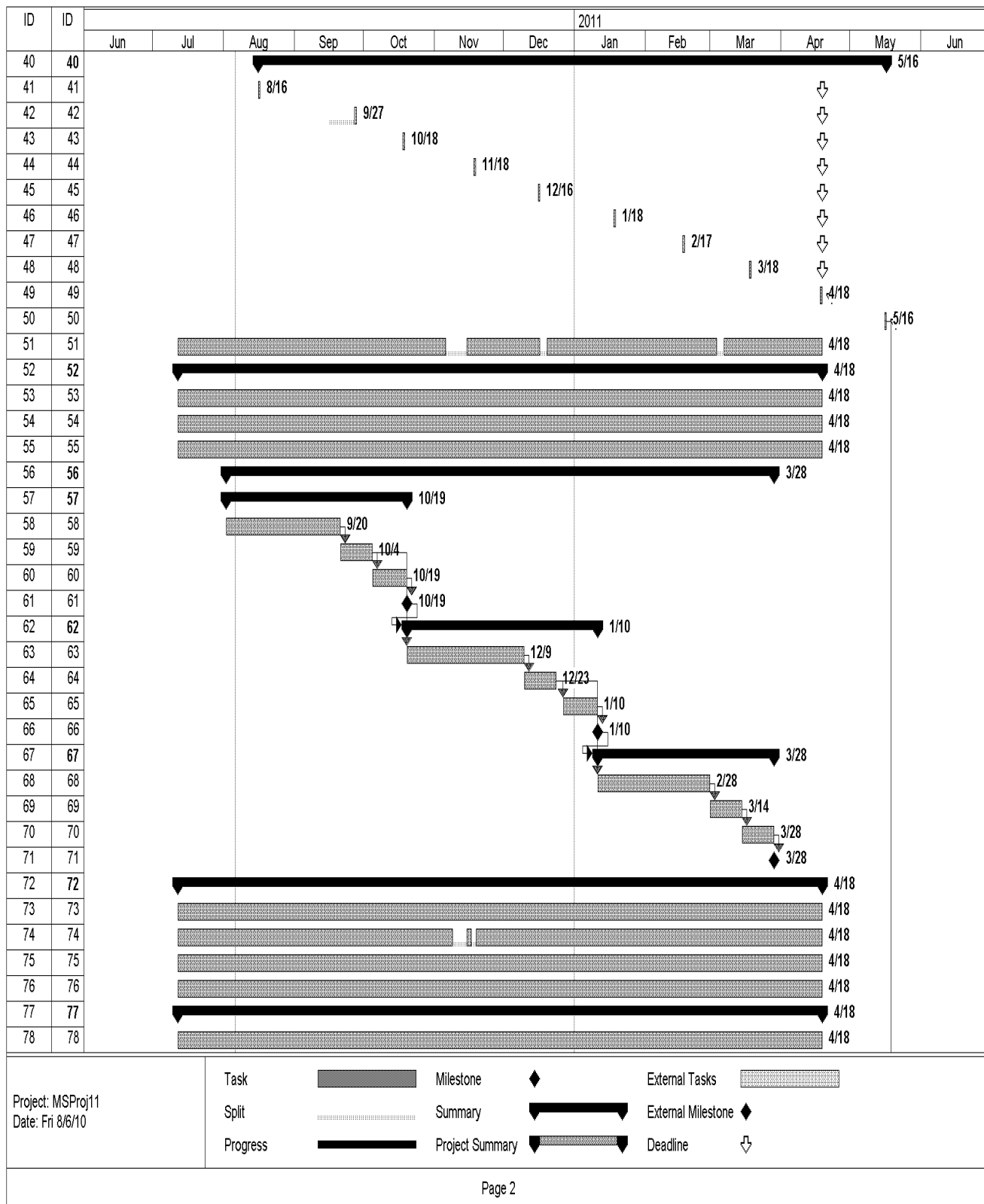
Budget Breakdown

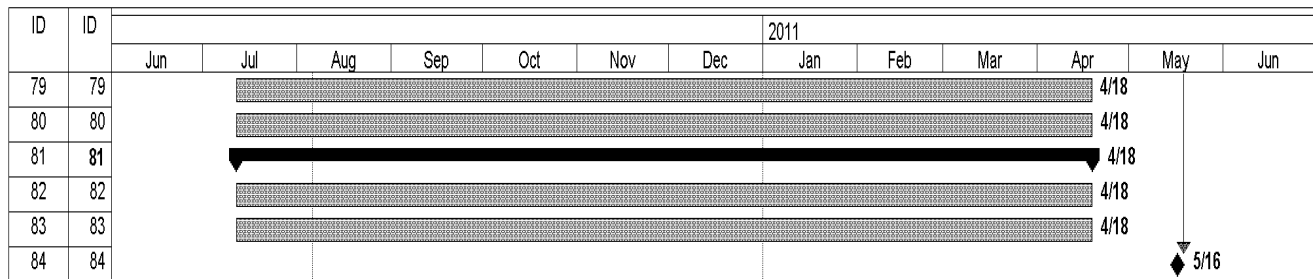
Activity	FY09	FY10	FY11	FY12	FY13
Management	200K	260K	150K	150K	175K
Complete Development MADIS, High-Res Models, ARAC/HySPLIT Dispersion, FXC Client & Server Software	968K	806.5K	566.4K	361.6K	92K
Field Deployment	3-5 sites 250K	3 sites 204.3K	4 sites 150K	PDA/Cell 125K	0
Plume Dispersion Training Regions/WFOs/EOCs	240K	200K	125K	50K	0
GTAS FXC Training Regions/WFO/EOC	99.5K	99.5K	65.2K	108.4K	0
System Requirements/Architecture Documentation	34.5K	70K	168.4K	250K	463K
Chemical Sensor Research/Ingest/Display	0	0	75K	75K	170K
GTAS Evaluation	308K	259.7K	250K	200K	200K
Total Annual Cost	\$2.100M	\$1.900M	\$1.550M	\$1.320M	\$1.100M

ATTACHMENT

Project Schedule and Milestones







Project: MSProj11 Date: Fri 8/6/10	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	